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Studies in Sisyrinchium.—III: S. angustifolium and some related Species new and old.

By EUGENE P. BICKNELL.

The common Blue-eyed Grass of the eastern states, *Sisyrinchium angustifolium* Miller, may be taken as representative of a section of the genus *Sisyrinchium*, embracing those species having simple leafless stems with terminal spathes. The group of species so characterized, if not strictly a natural one, forms, nevertheless, a well-marked assemblage in the genus which it is altogether convenient to recognize. Nor is this subdivision entirely without natural status, for, taking the genus in North America as a whole, the degree of branching shown by the different species is seen to be correlated to some extent with their distribution. Thus the simple-stemmed species are, as a group, of more northern and alpine distribution than those which develop pedunculate spathes from one or more leaf-bearing nodes, while, on the other hand, the species having a definitely compound system of branching are all distinctively southern.

Little inconvenience appears to have resulted from our imperfect knowledge of this particular group of Blue-eyed Grasses, for long-established practice in the matter of identification has referred the simple-stemmed plants, one and all, to the species *S. angustifolium*, under whatever name designated. A very interesting series of distinct species has thus been overlooked.

No account is here taken of the northwestern *S. grandiflorum*

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Dougl., which forms a genus clearly distinct from *Sisyrinchium*, nor of the yellow-flowered California species, *S. Californicum* Dryand and *S. Elmeri* Greene, which again are not of the same generic type as our blue-flowered species. This matter will be discussed in a subsequent paper.

SISYRINCHIUM ANGUSTIFOLIUM Miller, Dict. ed. VII. 1759.

S. Bermudiana L. Sp. Pl. 954. In part. (?) 1753.

S. gramineum Lam. Encyc. **1**: 408. 1783.

S. anceps Cav. Diss. **6**: 345. *pl. 190, f. 2.* 1788.

S. montanum Greene, Pittonia, **4**: 33. 1899.

Tufted, or sometimes of scattered habit, commonly 20–30 cm. high (8–56 cm.) stiff and erect, more or less glaucous. Leaves usually ½ to ¾ the height of the stem and 1.5–2.5 mm. wide (1–3.5 mm.) linear and attenuate or sometimes slightly broadened upwards and acuminate, the edges usually serrulate-roughened: stems simple and leafless, or occasionally bearing a single leaf subtending one or two branches 5–12 cm. long, 1–2 mm. or even 3 mm. wide, wing-margined, the wings equaling or broader than the width of the proper stem, rarely narrower, more or less serrulate or denticulate-roughened, apparently never wholly smooth in the eastern plant: spathes erect, green or sometimes purplish-tinged; outer bract 2–6 cm. long, surpassing the inner one 1.5–4 cm., rarely less than twice its length, slenderly attenuate or broader and more abruptly acute, obscurely hyaline-margined, clasping for 2–6 mm. at base; inner bract 1.5–3 cm. long, hyaline-margined, acute to narrowly attenuate; interior scales silvery white, narrow, usually about half the length of the inner bract: flowers 1–8, violet-blue; perianth 10–12 mm. long; stamineal column 4–6 mm. high; pedicels erect or nearly so, 17–25 mm. long, shorter or slightly longer than the inner bract: capsules 4–6 mm. high, mostly oblong-subglobose and only obscurely trigonous pale, but often clouded with brownish-purple.

This species is far more widely distributed than any other one of its genus, ranging from Newfoundland and New Jersey to Saskatchewan and Montana and southward along the eastern mountains to Virginia and in the west to southern Colorado. I have seen no specimens from west of the Rocky Mountains.

It is scarcely to be thought that the species holds true throughout this wide range and indications are that, even as here limited, it is still something of an aggregate and will be found to include at least several geographical races.

The more eastern plant must, of course, be taken as typical of the species. It ranges from Newfoundland and Quebec south to New Jersey and in the Alleghanies to Virginia. Specimens from this general region show more or less discoloration from drying, but not nearly to the same extent as in *S. graminoides*. Specimens from Ontario to Saskatchewan and Colorado show little change of color on the herbarium sheet and differ further from the more eastern plant in being more glaucous and stiffer with leaves of rather thicker texture. Several specimens from British America are unusually slender and apparently small-flowered. Others from Minnesota are unusually stout and glaucous, and with some uniformity have the spathes brightly colored with red-purple quite in contrast with anything seen from elsewhere, although the eastern plant sometimes has the spathes tinged with dull purple. Still other specimens from Minnesota are tall and slender and apparently scarcely glaucous, the spathes long and narrow, the flowers on very slender pedicels and with delicately membranous perianth.

Several collections from Nebraska, well illustrated by Rydberg's no. 373 from Banner Co. and no. 1251, "Flora of the Sand Hills," are noteworthy by reason of stout central stem with relatively narrow and smooth-edged wing-margins, rather long pedicels and subglobose, corrugated capsules. Several of these specimens are branched. I have little doubt that this plant is entitled to a distinctive name.

Specimens collected in Newfoundland by Dr. Robinson and Mr. Schrenk are very small throughout with thin broadly winged stem and thin leaves, the capsules only 2 mm. high or less and on somewhat spreading pedicels; these specimens show quite as much discoloration as *S. graminoides*. Specimens from Mt. Desert Island, Maine, collected by Rand and Redfield are well developed examples of the usual eastern plant, and New Brunswick and Prince Edward Island specimens are similar.

The species comes into flower in most sections of its range from the middle of May till the middle of June, or later at high elevations. In the neighborhood of New York flowering is sometimes over in the second week of June. As far east as Newfoundland the flowering period is much later, from the end of June until late August, as shown by the collections of Waghorne and Robinson and Schrenk.

SPECIMENS EXAMINED.

Virginia: Mountain Lake, 4,000 ft. alt. Britton.

Pennsylvania: Pike Co., E. P. B.

New York: N. Y. Co., E. P. B.; Westchester Co., Mrs. E. G. Britton; Greene Co., Miss A. M. Vail; Chemung Co., Lucy; Chenango Co., Stewart; Tompkins Co., Rowlee, Kilbourne; Onondaga Co., Brower; Oswego Co., DeForest; Otsego Co.; Washington Co., Fitch.

Massachusetts: Berkshire Co., "1828"; Hampden Co., Rusby; Bristol Co., Sturtevant; Middlesex Co., Underwood; Essex Co., Oakes.

New Hampshire: Cheshire Co., Churchill.

Maine: York Co., Hill, E. P. B.; Mt. Desert, Redfield, E. P. B.

New Brunswick: Goodwin.

Prince Edward Island: Macoun.

Newfoundland: Robinson and Schrenk, Waghorne.

Quebec: Danville, Berg; Montreal, Kelly.

Ontario: Lambton Co., Dodge; Jones Falls, Fowler; Toronto Island, Armstrong; Casselman, Macoun; Lincoln and Welland McCalla.

Michigan: Jackson Co., Camp.

Assinoboia: Crane Lake, Macoun.

Saskatchewan: Bourgeau, 1858.

British America: Dr. Richardson.

Minnesota: Aitken Co.; Cass Co., Anderson; Cook Co., Cheney; Crow Wing Co., Sheldon; Lake Co., Sandberg; Mille Lacs, Sheldon; Pipestone Co., Menzel; St. Louis Co., Arthur.

North Dakota: Grand Forks Co., Bannon.

South Dakota: Black Hills, Rydberg, W. S. Rusby; Beadle Co., Douglass.

Montana: Park Co., Tweedy; Belt River, Williams; Custer, Blankinship; Madison and Gallatin Cos., Rydberg.

Nebraska: Ft. Union and Badland Creek, Hayden, 1853-4; Sheridan Co., J. G. Smith and Pound; Sioux Co., Williams; Banner Co., Rydberg; Cherry Co., Wilcox.

Colorado: North Boulder Peak, 6,500 ft., Pinard; Canyon City, Brandegee; Pike's Peak, Trelease; Ft. Collins, 5,000 ft., Baker; Table Rock, Crandall: Clear Creek, Englemann; South

Park, Wolf and Rothrock; Lorimer Co., 9,000 ft., Crandall; La Plata Mts., 9,000 ft., Baker, Earle and Tracy.

SISYRINCHIUM MUCRONATUM Michx. Fl. Bor. Am. **2**: 33. 1803.

Caespitose in close tufts often loosely invested below with the tangled and fibrillose remains of withered leaves; roots numerous and matted, very slender. Leaves and stems dull-green to glaucescent, slender, the leaves commonly half the height of the stem, but sometimes equaling it, varying from capillaceous to 2 mm. wide, taper-pointed, smooth-edged or minutely denticulate or serrulate. Stems numerous, 10–46 cm. tall, varying from capillaceous and merely margined to 1.5 mm. wide and narrowly winged, the edges very smooth to denticulate-roughened, simple or occasionally short-branched at the top; spathes straight or slightly bent, the thin bracts smooth or, exceptionally, obscurely scabrous, usually or often bright red-purple, but varying to green, narrowly hyaline-margined, the outer one 1.8–5.7 cm. long, united-clasping for 1–4 mm. at base, the slender prolongation surpassing the inner bract 4–28 mm.; inner bract emerging gradually from the outer one, 10–16 mm. long, herbaceous, attenuate and acute, or the apex obtuse and scarious or even bifid; interior scales narrow and attenuate, mostly about half the length of the inner bract. Flowers 2–7, mostly deep purple-blue, sometimes white; perianth 6–14 mm. long; stamineal-column 4–5 mm. high: capsules on slender somewhat spreading pedicels 1–2 cm. long, 2–4 mm. high, trigonous, subglobose, broadly oblong, or somewhat obovate, not impressed at base, sometimes even narrowed into the pedicel, thin-walled, pale but usually purplish-tinged at maturity; seeds subglobose, black, pitted and prominently umbilicate, 1–1.2 mm. in diameter.

Southeastern Michigan and Ontario to eastern Pennsylvania, Washington, D. C., and Virginia, in meadows and grassy places or sometimes in dry soil. Flowers in May and June, beginning about the middle of May in the neighborhood of Washington; fruit ripe early in July in the Alleghany region of east Pennsylvania.

Michigan: St. Clair Co., C. K. Dodge; Ontario: Lambton Co., C. K. Dodge, Wingham, J. A. Morton; New York: Ithaca, Herb. Cornell Univ.; Pennsylvania: Union Co., H. R. Noll; Monroe Co., N. L. Britton, E. P. B.; Pike Co., E. P. B.; Philadelphia, A. B. Monoy; Isaac P. Martendale (1872); Washington, D. C.: Lester F. Ward, G. McCarthy; Virginia: Dyke, T. H. Kearney, Jr.

It is at last possible to understand this long misdoubted species of Michaux and to dispel the uncertainty which has always attached to the exact application of its name. The species is a perfectly authentic one and has failed of recognition evidently because never properly distinguished from the commoner and far more widespread *S. angustifolium*, a plant of similar habit, but stouter and more glaucous and differing especially in its much larger fruit.

While the distinctness of these two plants is not at all a matter of doubt, the variation of *S. mucronatum* is so considerable that, in order to define that species understandingly it will be well to give sharper definition to the type as contrasted with certain stouter forms of the plant which take on more the likeness of *S. angustifolium.* Michaux's description can no longer be misunderstood and the type of *S. mucronatum* may be confidently taken as the smallest form of the plant markedly set apart by almost capillaceous stem and leaves, small flowers and conspicuously red-purple spathes. This is an exceedingly delicate and attractive little plant rendered especially striking by its close and numerous capillary appearing stems tipped with the bright-colored spathes. In this extreme form of the plant the tufts are but 10–20 cm. high and the leaves and stems only .5–1 mm. wide, the latter merely margined and with the edges mostly very smooth. The leaves, commonly about one half the height of the stems, are erect and almost setaceous, the edges sometimes obscurely roughened at the apex. The narrow spathes have the outer bract 12–24 mm. long and aristulate-prolonged for 5–12 mm. beyond the inner one which is scarious-obtuse or bifid at the apex and apiculate from the midnerve; the flowers are few and small, the perianth appearing to be only 6–8 mm. long, on capillary, exserted, somewhat spreading pedicels 10–16 mm. long, fruit not seen.

In this typical state the plant cannot possibly be confused with any other species; nevertheless it appears to pass into an every way larger form the extreme state of which simulates forms of *S. angustifolium* from which, however, the smaller, more globose fruit readily distinguishes it. The stoutest example seen, from Washington, D. C., has larger flowers than occur in any other eastern species the perianth being 12–14 mm. long.

A form of the plant found by Dr. Britton and myself fruiting in abundance in a damp meadow near Tannersville, Pa., July 4, 1896, is tall and slender the numerous leaves nearly as long as the stems, many of which bear a bracteal leaf near the top subtending one or two peduncles. The plants were pale in color and the more branched forms bore rather a close resemblance to forms of *S. Atlanticum.*

In two or three of many specimens the bracts of the spathe are very obscurely scabrous.

The forms of the plant here referred to look remarkably different from the type, but the extremes appear to intergrade and the expediency of recognizing any of them as varieties does not clearly appear from the material at present before me.

Sisyrinchium campestre sp. nov.

Closely caespitose, commonly 15–20 cm. high (10–30 cm. or more) erect, stiff, glaucous or glaucescent. Leaves half the height of the stem or longer, sometimes surpassing the stem, 1–1.5 mm., rarely 2 mm. wide, the edges smooth, the bases tinged with pale dull purple: stem .5–1.5 mm. wide, narrowly wing-margined, the wings finely close-striate, often obscurely scabrous on the sides, especially above, the edges smooth; spathe pale dull purple to green, the bracts minutely roughened with somewhat glandulose points to canescently scabrous-puberulent, or sometimes glabrous, primary bract 2.5–4.5 cm. long, narrowly attenuate, often setaceously slender, stiff and straight or slightly incurved, obtuse or acute, surpassing the inner bract 1–2.5 cm., the margins narrowly hyaline below, not at all united-clasping at the base or but slightly so; base of inner bract usually rounding out rather abruptly from the primary one, especially at full maturity, giving the spathe a somewhat gibbous character, the bract 1.2–2 cm. long, narrowed or slenderly attenuate to the acute apex, the edges noticeably white-hyaline; interior scales commonly broader than in *S. mucronatum:* flowers 4–9, pale blue to white; perianth delicate, 8–14 mm. long; stamineal column 3–5 mm. high; pedicels 10–16 mm. long, usually not surpassing the inner bract and little spreading: capsules pale at maturity, 2–4 mm. high, trigonous-subglobose, often depressed, and impressed at base but sometimes cuneate-obovate, sparsely puberulent, minutely rugulose, sometimes also venose-reticulated; seeds few in each cell, 1–1.25 in longer diameter, irregularly obovoid-subglobose or oblong, somewhat angled, black, at full maturity, only faintly pitted umbilicate.

Wisconsin to North Dakota, south to Louisiana, Oklohoma and the mountains of New Mexico, on prairies, in meadows and in rocky open woods, flowering in May and June.

Wisconsin: Madison, Trelease.

Minnesota: Chicago Co., Taylor; Goodhue Co., Sandberg; Hennepin Co., many collectors; Meeker Co., Frost; McLeod Co., McElligott; Nicollet Co., Ballard; Ramsey Co., Sheldon; Swift Co., Payne; Waseca Co., Taylor.

North Dakota: Geyer (1839).

South Dakota: Clay Co., Geyer; Lincoln Co., Redfield.

Nebraska: Lancaster Co., Webber; Saline Co., Siegreist, Hayden (1853).

Missouri; Atchison Co., Bush; Jackson Co., Bush; Jefferson Co., Englemann (1862).

Kansas: Riley Co., Bassler, Norton.

Arkansas: Nuttall.

Oklahoma: Waugh.

New Mexico: Hermit's Peak, Snow.

Illinois: Menard Co., Hall.

Iowa: Fayette Co., Fink; Pottawattamie Co., Hayden; Story Co., Hitchcock; Winneshiek Co., Collett.

Louisiana: Natchitoches Co., Hale.

Nearly allied to *S. mucronatum* Michx. certain forms of the two plants even appearing scarcely different—always a logical expectation from conditions of close relationship between plants, however distinct. Notwithstanding such dubious forms, the normal development of the two plants takes place along obviously different lines. In its typical state *S. campestre* is mostly a more glaucous plant than *S. mucronatum*, of stiffer habit, with smooth-edged stem and leaves, and paler blue or frequently white flowers on rather less exserted pedicels; the spathe is relatively larger with stiffer primary bract, and though often of a dull pink-purple shade never develops the bright red-purple color so conspicuous in typical *S. mucronatum*; its bracts are also usually less membranous than in *S. mucronatum*, the outer one scarcely if at all united-clasping at the base permitting a more abrupt protrusion of the inner one which tends to be more broadly hyaline along the margins.

The close relationship of the species to *S. mucronatum* would lead to an expectation of somewhat parallel lines of variation in the two plants. These, indeed, prove to exist. Furthermore, *S. campestre* is nearly related to the twin-spathed species, *S. albidum*

Raf., just as *S. mucronatum* is nearly related to the twin-spathed *S. scabrellum*, only with this reversal in the terms of the relationship that, in the one case the rough-bracted plant is the one with the solitary spathe, in the other case the one with the spathes geminate.

Several more or less well-defined strains of variation may be traced running through herbarium material of *S. campestre*, but there is no sufficient evidence that these represent anything more than mere states of the species, any one of which might appear under the appropriate conditions of soil and situation.

The form taken as typical has the stem 1–1.5 mm. wide, commonly much surpassing the slightly broader leaves, and densely scabrous-puberulent spathes often of a pale purple color, the primary bract acute or obtusely pointed and surpassing the inner bract 1–2 cm., the inner bract 1–2 cm. long, herbaceous attenuate or hyaline-margined to the acute apex, the flowers usually light-blue and about 10 mm. long on slender pedicels subequal with the inner bract.

This plant is common in Minnesota, extending west to the Dakotas and south to Missouri and Kansas.

A few specimens from Minnesota are unusually stiff and glaucous, with the perianth sometimes 14 mm. long.

Certain other specimens are greener, the spathes showing little or no purplish tinge, the inner bract often broader and having the more scarious margins somewhat abruptly narrowed to the shorter tip.

A small proportion of specimens have the bracts quite smooth. Such plants seem to be rare as far north as Minnesota, but more frequent further south; they show a tendency to a slightly broader stem than the type, especially near the base of the spathe, and broader inner bract, and are frequently white-flowered, apparently representing a transition to the variety *Kansanum* described below. Specimens of this smooth-bracted plant are, on technical characters, sometimes with difficulty separable from *S. mucronatum*, but as a rule are rather stouter, with smooth-edged stem, stiffer leaves, broader inner bract and less united outer one.

Differing strikingly from the type when extreme forms are compared but appearing to intergrade with it is a very slender form which is frequent or common in Minnesota and Missouri. The leaves are relatively long and with the stems mostly less than 1 mm. wide, the spathes small and slender in proportion, the outer bract and frequently the inner one very slenderly attenuate. Certain of these slender specimens from Minnesota have numerous unusually elongated leaves considerably surpassing the stems, very short spathes and pedicels and capsules only 1.5–2.5 mm. high; some of these specimens have no purplish tinge in the bracts and appear to be scarcely glaucescent; rarely their bracts are quite glabrous.

Sisyrinchium campestre Kansanum var. nov.

Pale and glaucous, rarely showing any purple tinge in the bracts, 15–30 cm. high. Leaves stiff and erect, straight or falcate, often equaling the stem, 1–2.5 mm. wide, closely striate, mostly cuspidate-acute, smooth-edged, sometimes when young roughened on the sides with minute points: stems 1–2 mm. wide, the wings mostly wider than the proper stem and perceptibly broadened into the base of the spathe, striate, the edges smooth; sides of the stem sometimes minutely roughened especially near the top: spathes stiffly erect, the broad base appearing abruptly transverse across the top of the stem, the bracts herbaceous and striate, smooth or rarely obscurely scabrous; primary bract stiff, erect or curved, slenderly prolonged, 2.5–6.5 cm. long, surpassing the inner bract 1.2–3.0 cm., blunt-pointed or slenderly acute, the margins below narrowly white-hyaline, usually not at all united at the base; inner bract 1.5–2.7 cm. long, broad below and abruptly emerging from the outer one, keeled, herbaceous-attenuate or the broad white-scarious margins abruptly narrowed to the obtuse or merely acute apex. Flowers white, large, the perianth delicate, sometimes over 14 mm. long, its divisions obovate-oblong, apparently not emarginate and very short aristulate; stamineal column 4 mm. high; pedicels 12–17 mm. long, shorter than the inner bract, more or less margined: capsules apparently not larger than in *S. campestre*, trilobulate-subglobose, 3–5 mm. high, glandular puberulent when young; mature seeds not seen: roots stronger, darker and less fibrillose than in *S. campestre*.

Eastern and middle Kansas and Oklahoma, doubtfully from southeastern Nebraska and western Missouri, occurring on prairies and flowering from the middle of April into June. Kansas: Davis Co., Ft. Riley, April 27, 1892, type, in Herb. Columbia University; Riley Co., J. B. Norton, T. Bassler; McPherson Co., J. E. Bodin; Douglas Co., "J. G. B." Oklahoma: "Waugh."

In its fully developed state this plant presents so striking a contrast with usual forms of *S. campestre* that there would seem to be little doubt of its being a distinct species; nevertheless, forms apparently intermediate between the two occur with them. It is evidently impossible to determine the exact status of the plant from present material.

Sisyrinchium flaviflorum sp. nov.

Tufted, about 25 cm. high, dull green and glaucescent; older roots coarse and simple or nearly so. Leaves about three-quarters the height of the stems, 1–2 mm. wide, the larger ones broadened upwards, acute, striate, the edges nearly or quite smooth: stems 1.25–2 mm. wide, stiff and erect or sometimes curved, broadened into the base of the spathe, the wings prominently striate, smooth-edged; spathes green, 4–5 mm. wide near the base; primary bract very large and foliaceous, often curved, about 6 cm. long, obtusely pointed, surpassing the second bract 3–4 cm., very narrowly hyaline below, the margins free to the base; inner bract 2–2.5 cm. long, hyaline-margined, herbaceous attenuate to the obtuse apex, emerging rather abruptly from the base of the spathe: flowers apparently few on pedicels 10–15 mm. long, much shorter than the inner bract; perianth clear lemon yellow, about 12 mm. long, apparently of rather thick texture and minutely granulose-glandular, the divisions abruptly rounded or truncate at the tip, very short aristulate; column about 5 mm. high; anthers rather large, 2–2.5 mm. long, apparently less contiguous than in allied species with the filaments less coherent at the top; young capsules obovate-oblong, glandular-puberulent.

Missouri: Courtney, B. F. Bush. Type in Herb. Missouri Bot. Gard., June 7, 1892, just in flower.

Similar in general appearance to large examples of *S. campestre Kansanum* but of a peculiar dull green color with larger spathes and especially larger and more foliaceous primary bract. The flowers, however, afford the most distinctive feature of the plant and appear to be peculiar in texture as well as in color, and in larger anthers as compared with related forms.

Mr. B. F. Bush, of Courtney, Missouri, the discoverer of this interesting plant appears to be the only person who has ever met with it. Specimens sent by him some years ago to the Gray Herbarium were referred to by Dr. Watson as being probably a form of *S. angustifolium* (Gray's Manual, ed. 6, 735).

Mr. Bush writes me in regard to this plant that it grows in open Black Jack woods on the borders of prairies, while *S. angustifolium* (*S. campestre*) grows on bare prairies and *S. graminoides* in wet meadows. It does not occur with either of the other two species and only occurs in two or three localities near here, Courtney, Mo.

SISYRINCHIUM ALBIDUM Raf. Atl. Jour. 17. 1832.

Dull or rather bright green, the spathes often tinged with dull red-purple, glaucous or glaucescent, commonly 30 cm. or less high (15–46 cm.). Leaves about half the height of the stem, mostly 1.5 mm. wide (.5–3.5 mm.), very acute, smooth-edged, but often serrulate above or sometimes throughout: stems commonly 1.5 mm. wide (1–3 mm.), often very flat, the wings thin and striate, usually broader than the proper stem, serrulate or hispidulous on the edges or sometimes smooth: spathes two, contiguous and sessile at the top of the stem or rarely the outer one pedunculate on a short divergent branch, each two-bracted; primary bract 2.5–7 cm. long, foliaceous or slenderly attenuate, acute or obtuse, surpassing the inner bracts 1.2–5 cm. the edges free to the base and scarcely hyaline; outer bract of second spathe 1.3–2.7 cm. long, hyaline-margined, the tip herbaceous, sometimes obtuse, but usually acute or attenuate, subequal with its fellow or surpassing it by as much as 12 mm.; keels of inner bracts often ciliolate; interior scales about three quarters the length of the shorter bracts: flowers varying from clear white to violet-blue, sometimes as many as nine in each spathe; perianth 8–12 mm. long; stamineal column 4–5 mm. high: capsules pale, rather thick walled, depressed-subglobose, 2–3 mm. high on slender, erect, or slightly spreading pedicels 10–22 mm. long, little if at all longer than the shorter bracts: seeds black, globose, prominently umbilicate, distinctly pitted .75–1 mm. in diameter.

Alabama and Louisiana to Missouri and Michigan; North Carolina. Flowering in early April in the extreme south, in April and early May as far north as southern Illinois, in late May and early June in northern Illinois and Michigan.

Alabama: Tuscaloosa Co., Dr. E. A. Smith.

Mississippi: Oktibbeha Co., S. M. Tracy.

Louisiana: Dr. Hale.

Tennessee: Sewanee, E. Kirby Smith.

North Carolina: Stanly Co., W. W. Ashe.

Kentucky: Dr. C. W. Short (1840); Warren Co., Miss Sadie F. Price.

Missouri: St. Louis Co., Dr. Englemann (1838–1865).

Illinois: Hancock Co., S. B. Mead (1842); Cook Co., Dr. W. Moffat.

Indiana: Tippecanoe Co., A H. Young.

Michigan: Cass Co., C. F. Wheeler; Jackson Co., C. F. Wheeler, S. H. & D. R. Camp; Ingham Co., C. F. Wheeler; Livingston Co., C. F. Wheeler, Belle Isle, Detroit River, O. A. Farwell; Keeweenaw Co., O. A. Farwell.

It is difficult to frame an exact definition of this plant from present material which, while fully attesting the distinctness of the species from the old *S. angustifolium* and the more nearly related *S. campestre*, appears to point to a still further problem in segregation while not permitting its solution. In appearance the plant is similar to *S. angustifolium* or, in its more slender forms, to *S. campestre* but differs from both in its uniformly twin spathes and from the former in mostly white or pale blue flowers and smaller fruit.

The type locality for the species is West Kentucky and specimens from this general region have been more particularly held in view in the foregoing description. So far as specimens and notes on labels indicate the plant is here uniformly white-flowered. Specimens from prairies near Chicago have large very pale blue flowers and unusually long bracts, which on a few of the plants are obscurely scabrous on the sides, a feature shown only by one other specimen of my series, also from Illinois.

From Sewanee, Tenn., comes a specimen having apparently very small blue flowers and capsules but 1 mm. or less high. The only specimen seen from Louisiana is very pale in color and has stout spathes with long, slenderly attenuate primary bracts; the apparently small flowers are white on somewhat slenderly exserted pedicels. Specimens collected in Mississippi by Prof. S. M. Tracy are noteworthy from their large size and broad leaves and stems, the former becoming 3.5 mm. wide; the spathes are unusually stout, the pale blue flowers seemingly of medium size. Contrasting so markedly with these as to seem quite distinct yet apparently connected by intermediate forms, are certain specimens from Michigan communicated by Professor C. F. Wheeler and Mr. O. A. Farwell. These are extremely slender, the stems and leaves from .75–1.5 mm. wide, the spathes abruptly broader than the stems and with the outer bracts unusually slender and elongated; the blue flowers are rather small and delicate. Some of these specimens seem to be scarcely if at all glaucous and with thinner leaves and bracts than other forms; the stems are mostly only narrowly winged.

Sisyrinchium heterocarpum sp. nov.

Apparently but little tufted, bright green or yellowish green, glaucous, stiff and erect, 20–30 cm. high; roots pale, fleshy, tapering from thickened bases sometimes 2 mm. wide. Leaves half the height of the stem or longer, 1–2 mm. wide, tapering, acute, the edges smooth: stem 1–1.5 mm. wide, narrowly winged, the edges smooth or bearing some minute harsh points towards the base: spathes sometimes slightly purplish tinged, erect, narrow, sometimes scarcely exceeding the width of the stem, sometimes becoming 2–3 mm. wide about the middle; inner bract often weakly developed or inconspicuous, 1.5–2 cm. long, scarious-margined usually to the acute apex; outer bract 2.5–4.5 cm. long, above slender and acute, surpassing the inner bract 1–2.5 cm., the lower margins hyaline, united for 3–5 mm. at base: perianth violet-purple, about 10 mm. long; stamineal column 5 mm. high: capsules of two kinds, terminal and basal, the latter more or less concealed among the bases of the leaves, those from the terminal spathes few, 1–4, pale, subglobose or sometimes obovoid, rather large, 5–7 mm. high on erect scarcely exserted pedicels only 10–20 mm. long; basal capsules 2–4, on slender erect pedicels 2.5–3.5 cm. long, obovoid-pyriform, 7–10 mm. long from the narrowed base, 4–5 mm. wide, rather thinner walled than the terminal ones and more or less transversely corrugate conformably with the position of the seeds, a feature less evident in the terminal capsules: seeds (not quite mature) black, obovoid-subglobose, angled and rugulose-pitted, stipitate, 1 mm. in diameter.

Wyoming: Cummins, July 30, 1895, in full flower and with immature fruit; Table Mountain, June 30, 1895, in full flower and with immature fruit; Dubois, August 10, 1894, nearly mature fruit and immature flower buds.

An interesting plant known only from the collections of Professor Aven Nelson. In general aspect of leaf and stem it closely matches slender forms of *S. angustifolium* to which species it is evidently nearly allied.

The development of basal flowers and fruit is an unexpected character in the genus and were it shown by a single specimen only might reasonably be referred to an abnormal condition. It is however exhibited by five perfectly healthy examples collected at different times in three distinct localities.

The origin of these basal flowers may perhaps be referred to suppressed development of the usual stem. They occur either in separate leaf clusters or among the leaves about the bases of normal stems, but in the latter case although enclosed by the same outer leaves as the stem they nevertheless belong to an inner tuft of leaves which arises from a separate point of the axis.

Some plants show no indications of these radical flowers and are then with difficulty separable from *S. angustifolium*. The plant appears to need comparison with no other species than this. It differs in narrower mostly smooth-edged leaves and stem, smaller and narrower spathes, less developed inner bract, shorter pedicels and larger more globose or pyriform paler capsules, often transversely corrugate. The thickened roots are a further noteworthy character. The few flowers seen are rather smaller than those of *S. angustifolium*, the divisions of the perianth less rounded at the apex and more distinctly aristulate, the yellow eye also appears to be larger.

In some specimens the basal and terminal capsules are of about equal age; others show at the same time basal capsules nearly mature, and upper spathes still tightly enclosing their flower buds. The successive opening of the flowers appears to be remarkably prolonged or irregular for several spathes which bear nearly mature capsules also enclose very immature flower buds.

Mounted on several sheets among fruiting specimens are a few plants just in flower which are larger, stouter and broader leaved with longer pedicels; these are apparently not distinguishable from *S. angustifolium* and may be referable to that species. They are, however, of the same bright, pale-green hue of *S. heterocarpum*, with smooth-edged stems, and their time of first-flowering, August, is hard to reconcile with what is known of the flowering period of *S. angustifolium*. A few of the specimens of *S. heterocarpum* show some stems stouter than the others and somewhat approaching these. Evidently the plant in all its phases cannot be fully understood from present material and its exact relationship to *S. angustifolium* must remain a subject for future study.